

CLAIMS:

I Claim:

1. A vehicle, comprising:
 - an occupant sensing system arranged to determine at least one property or characteristic of occupancy of the vehicle constituting information about the occupancy of the vehicle;
 - a crash sensor system for determining when the vehicle experiences a crash; and
 - a communications device coupled to said occupant sensing system and said crash sensor system and arranged to enable a communications channel to be established between the vehicle and a remote facility after the vehicle is determined to have experienced a crash to thereby enable the information about the occupancy of the vehicle determined by said occupant sensing system to be transmitted via said communications channel to the remote facility.
2. The vehicle of claim 1, wherein said communications device comprises a cellular telephone system including an antenna.
3. The vehicle of claim 1, wherein said occupant sensing system includes an image-obtaining sensor arranged to obtain images of the passenger compartment of the vehicle, said communications device being arranged to transmit the images obtained by said image-obtaining sensor.
4. The vehicle of claim 3, wherein said image-obtaining sensor is arranged to obtain images including the driver of the vehicle, said communications device being arranged to transmit images of the passenger compartment just prior to the crash once said crash sensor system has determined that the vehicle has experienced a crash.
5. The vehicle of claim 3, wherein said image-obtaining sensor is arranged to obtain images including the driver of the vehicle, said communications device being arranged to transmit images of the passenger compartment during the crash once said crash sensor system has determined that the vehicle has experienced a crash.
6. The vehicle of claim 3, wherein said image-obtaining sensor is arranged to obtain images including the driver of the vehicle, said communications device being arranged to transmit images of the passenger compartment after the crash once said crash sensor system has determined that the vehicle has experienced a crash.

7. The vehicle of claim 1, wherein said occupant sensing system includes at least one motion sensor for obtaining information about motion of occupants in the passenger compartment, said communications device being arranged to transmit information about any motion of occupants in the passenger compartment obtained by said at least one motion sensor as part of the information about the occupancy of the vehicle.

8. The vehicle of claim 1, wherein said occupant sensing system comprises determining means for determining the number of occupants in the vehicle, said communications device being arranged to transmit the number of occupants in the passenger compartment as part of the information about the occupancy of the vehicle.

9. The vehicle of claim 8, wherein said determining means comprise receivers arranged to receive waves, energy or radiation from all of the seating locations in the passenger compartment and a processor arranged to determine the number of occupants in the passenger compartment from the received waves, energy or radiation.

10. The vehicle of claim 8, wherein said determining means comprise sensors selected from a group consisting of heartbeat sensors, weight sensors associated with seats in the vehicle and chemical sensors.

11. The vehicle of claim 1, wherein said occupancy sensing system comprises weight sensors arranged in each seat to determine the presence of the occupants based on the sensed weight.

12. The vehicle of claim 1, wherein said processor is arranged to determine the condition of any occupants in the vehicle.

13. The vehicle of claim 12, wherein said occupant sensing system comprises receivers arranged to receive waves, energy or radiation from the passenger compartment, said processor being arranged to determine the condition of any occupants in the vehicle based on the received waves, energy or radiation, said communications device being arranged to transmit the condition of the occupants as part of the information about the occupancy of the vehicle.

14. The vehicle of claim 1, further comprising at least one vehicle sensor each sensing a state of the vehicle or a state of a component of the vehicle, said communications device being coupled to said at least one vehicle sensor and being arranged to transmit the state of the vehicle or the state of the component of the vehicle.

15. The vehicle of claim 1, further comprising at least one environment sensor each arranged to sense a state of the environment around and exterior of the vehicle, said communications device being coupled to said at least one environment sensor and being arranged to transmit information about the environment of the vehicle as sensed by said at least one environment sensor.

16. The vehicle of claim 15, wherein said at least one environment sensor includes an optical sensor for obtaining images of the environment around the vehicle.

17. The vehicle of claim 15, wherein said at least one environment sensor includes at least one of a road condition sensor arranged to sense the condition of a road on which the vehicle is travelling, an ambient temperature sensor arranged to sense the temperature of the atmosphere surrounding the vehicle, an internal temperature sensor arranged to sense the temperature in the passenger compartment of the vehicle, a clock, and a location sensor arranged to sense the location of objects around the vehicle, sensors which sense the presence of rain, snow, sleet and fog, the presence and location of potholes, ice and snow cover, the presence and status of the road and traffic, sensors which obtain images of the environment surrounding the vehicle, blind spot detectors which provides data on the blind spot of the driver, automatic cruise control sensors that can provide images of vehicles in front of the vehicle and radar devices which provide the position of other vehicles and objects relative to the vehicle.

18. The vehicle of claim 1, further comprising a memory unit coupled to said occupant sensing system and said communications device, said memory unit being arranged to receive the information about the occupancy of the vehicle from said occupant sensing system and store the information about the occupancy of the vehicle, said communications device being arranged to interrogate said memory unit to obtain the stored information about the occupancy of the vehicle to enable transmission thereof.

19. A method for monitoring and providing assistance to a vehicle, comprising the steps of:

determining at least one property or characteristic of occupancy of the vehicle constituting information about the occupancy of the vehicle;

determining when the vehicle experiences a crash;

establishing a communications channel between the vehicle and a remote facility only after the vehicle is determined to have experienced a crash;

transmitting information about the occupancy of the vehicle after it has been determined that the vehicle has experienced a crash; and

at the remote facility, considering the information about the occupancy of the vehicle received from the vehicle and directing assistance to the vehicle based on the transmitted information.

20. The method of claim 19, further comprising the steps of:

obtaining images of the passenger compartment of the vehicle; and

transmitting the images of the passenger compartment after the crash.

21. The method of claim 20, wherein the step of obtaining images of the passenger compartment comprises the step of obtaining images including the driver of the vehicle, further comprising the step of transmitting the images of the passenger compartment just prior to the crash once it has determined that the vehicle has experienced a crash.

22. The method of claim 19, wherein the step of determining at least one property or characteristic of occupancy of the vehicle comprises the step of determining any motion in the passenger compartment of the vehicle, whereby information about any motion of occupants in the passenger compartment is transmitted as part of the information about the occupancy of the vehicle.

23. The method of claim 19, wherein the step of determining at least one property or characteristic of occupancy of the vehicle comprises the step of determining the number of occupants in the passenger compartment, the number of occupants in the passenger compartment being transmitted as part of the information about the occupancy of the vehicle.

24. The method of claim 23, wherein the step of determining the number of occupants in the vehicle comprises the steps of receiving waves, energy or radiation from all of the seating locations in the passenger compartment and determining the number of occupants in the passenger compartment from the

received waves, energy or radiation, the number of occupants in the passenger compartment being transmitted as part of the information about the occupancy of the vehicle.

25. The method of claim 23, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one heartbeat sensor in the vehicle to detect the presence of heartbeats in the vehicle such that the number of occupants is determinable from the number of detected heartbeats.

26. The method of claim 23, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one weight sensor system in the vehicle to detect at least one of the weight and weight distribution applied to the seats such that the number of occupants is determinable from the at least one of the detected weight and weight distribution.

27. The method of claim 23, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one temperature sensor to measure temperature in the passenger compartment whereby the number of occupants is determinable from the measured temperature in the passenger compartment.

28. The method of claim 23, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one seatbelt buckle switch to provide an indication of the seatbelt being buckled whereby the number of occupants is determinable from the buckled state of the seatbelts.

29. The method of claim 23, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one chemical sensor to provide an indication of the presence of a chemical indicative of the presence of an occupant whereby the number of occupants is determinable from the indication of the presence of the chemical indicative of the presence of an occupant.

30. The method of claim 19, wherein the step of determining at least one property of characteristic of occupancy of the vehicle comprises the steps of receiving waves, energy or radiation from at least one of the seating locations in the passenger compartment and determining the condition of

any occupants in the vehicle based on the received waves, energy or radiation, the condition of the occupants being transmitted as part of the information about the occupancy of the vehicle.

31. The method of claim 19, further comprising the steps of:
sensing a state of the vehicle or a state of a component of the vehicle; and
transmitting the state of the vehicle or the state of the component of the vehicle.

32. The method of claim 19, further comprising the steps of:
sensing a state of the environment around and exterior of the vehicle; and
transmitting information about the environment of the vehicle.

33. The method of claim 19, further comprising the steps of:
providing a memory unit in the vehicle to receive the information about the occupancy of the vehicle and store the information about the occupancy of the vehicle; and
interrogating the memory unit to obtain the stored information about the occupancy of the vehicle to enable transmission thereof.

34. A method for monitoring and providing assistance to a vehicle, comprising the steps of:
determining at least one property or characteristic of occupancy of the vehicle constituting information about the occupancy of the vehicle;
determining at least one state of the vehicle or of a component of the vehicle constituting information about the operation of the vehicle;
selectively establishing a communications channel between the vehicle and a remote facility;
transmitting the information about the occupancy of the vehicle and the information about the operation of the vehicle to the remote facility when the communications channel is established to enable assistance to be provided to the vehicle based on the transmitted information; and
at the remote facility, considering the information about the occupancy of the vehicle and the information about the operation of the vehicle received from the vehicle and directing assistance to the vehicle based on the transmitted information,
the step of selectively and automatically establishing a communications channel between the vehicle and a remote facility comprising the step of addressing a transmission of information about the occupancy of the vehicle differently than a transmission of information about the operation of the vehicle.

35. The method of claim 34, further comprising the steps of:
obtaining images of the passenger compartment of the vehicle; and
transmitting the images of the passenger compartment after a crash involving the vehicle.

36. The method of claim 35, further comprising the steps of:
determining when the vehicle experiences a crash, the step of obtaining images of the passenger compartment comprising the step of obtaining images including the driver of the vehicle; and
transmitting the images of the passenger compartment just prior to the crash once it has determined that the vehicle has experienced a crash.

37. The method of claim 34, wherein the step of determining at least one property or characteristic of occupancy of the vehicle comprises the step of determining any motion in the passenger compartment of the vehicle, whereby information about any motion of occupants in the passenger compartment is transmitted as part of the information about the occupancy of the vehicle.

38. The method of claim 34, wherein the step of determining at least one property or characteristic of occupancy of the vehicle comprises the step of determining the number of occupants in the passenger compartment, the number of occupants in the passenger compartment being transmitted as part of the information about the occupancy of the vehicle.

39. The method of claim 38, wherein the step of determining the number of occupants in the vehicle comprises the steps of receiving waves, energy or radiation from all of the seating locations in the passenger compartment and determining the number of occupants in the passenger compartment from the received waves, energy or radiation, the number of occupants in the passenger compartment being transmitted as part of the information about the occupancy of the vehicle.

40. The method of claim 38, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one heartbeat sensor in the vehicle to detect the presence of heartbeats in the vehicle such that the number of occupants is determinable from the number of detected heartbeats.

41. The method of claim 38, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one weight sensor system in the vehicle to detect at least one of the weight and weight distribution applied to the seats such that the number of occupants is determinable from the at least one of the detected weight and weight distribution.

42. The method of claim 38, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one temperature sensor to measure temperature in the passenger compartment whereby the number of occupants is determinable from the measured temperature in the passenger compartment.

43. The method of claim 38, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one seatbelt buckle switch to provide an indication of the seatbelt being buckled whereby the number of occupants is determinable from the buckled state of the seatbelts.

44. The method of claim 38, wherein the step of determining the number of occupants in the vehicle comprises the step of arranging at least one chemical sensor to provide an indication of the presence of a chemical indicative of the presence of an occupant whereby the number of occupants is determinable from the indication of the presence of the chemical indicative of the presence of an occupant.

45. The method of claim 38, wherein the step of determining at least one property or characteristic of occupancy of the vehicle further comprises the step of determining the condition of any occupants in the vehicle based on the received waves, energy or radiation, the condition of the occupants being transmitted as part of the information about the occupancy of the vehicle.

46. The method of claim 34, wherein the step of determining at least one property or characteristic of occupancy of the vehicles comprises the step of determining the number of human occupants in the passenger compartment.

47. The method of claim 34, further comprising the steps of:
sensing a state of the environment around and exterior of the vehicle; and
transmitting information about the environment of the vehicle.

48. The method of claim 34, further comprising the step of determining when the vehicle experiences a crash, the step of transmitting information about the occupancy of the vehicle comprising the step of transmitting information when it has been determined that the vehicle has experienced a crash.

49. The method of claim 34, further comprising the steps of:
providing a memory unit in the vehicle to receive the information about the occupancy of the vehicle and store the information about the occupancy of the vehicle; and
interrogating the memory unit to obtain the stored information about the occupancy of the vehicle to enable transmission thereof.